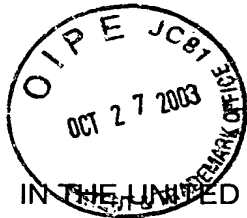


10/23/03



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of : Alan Frank PARKER
Serial no. : 10/651,072
Filed : August 28, 2003
For : ILLUMINATION DEVICE
Group Art Unit :
Examiner :
Docket : ROCKCO P61AUS

The Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

SUBMISSION OF CERTIFIED COPY

Dear Sir:

A claim for priority is hereby made under the provisions of 35 U.S.C. § 119 for the above-identified United States Patent Application based upon United Kingdom Patent Application No. 0220042.6 filed August 29, 2002. A certified copy of said United Kingdom application is enclosed herewith.

In the event that there are any fee deficiencies or additional fees are payable, please charge the same or credit any overpayment to our Deposit Account (Account No. 04-0213).

Respectfully submitted,

Michael J. Bujold, Reg. No. 32,018

Customer No. 020210

Davis & Bujold, P.L.L.C.

Fourth Floor

500 North Commercial Street

Manchester NH 03101-1151

Telephone 603-624-9220

Facsimile 603-624-9229

E-mail: patent@davisandbujold.com

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I hereby certify that this correspondence is being deposited with the United States Postal Service, with sufficient postage, as First Class Mail in an envelope addressed to: Director of the United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. October 23, 2003.

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INVESTOR IN PEOPLE

The Patent Office
Concept House
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Newport
South Wales
NP10 8QQ

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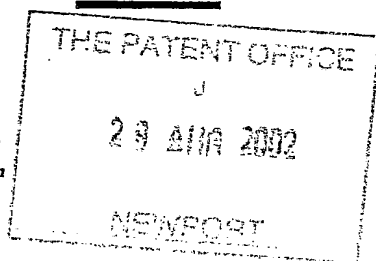


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29AUG02 2744403-1 002682
F01/7770-0.00-0220042.6

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The Patent Office

Cardiff Road
Newport
South Wales
NP9 1RH

1. Your reference

TELECTRA/ID

2. Patent application number

(The Patent Office will fill in this part)

0220042.6

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Telectra Limited
B3-B7 New Yatt Business Centre
New Yatt
Witney
OX29 6TJ

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

845373 0001
UK

4. Title of the invention

Illumination device

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Olaf C Rock
Rock and Company
Trelawn
Cassington
Witney
OX29 4DN

Patents ADP number (if you know it)

691220001

8271132001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

Yes

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d))

Patents Form 1/77

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Continuation sheets of this form

Description	5
Claim(s)	2
Abstract	1
Drawing(s)	1

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Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77) 1

Request for preliminary examination and search (Patents Form 9/77) 1

Request for substantive examination (Patents Form 10/77) 1

Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature

Date

12. Name and daytime telephone number of person to contact in the United Kingdom Olaf C Rock 01865 880389

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ILLUMINATION DEVICE

This invention relates to an illumination device. In particular it is concerned with an illumination device providing for more effective use of light from a light source.

For a given power input light output from a light source can vary between that from a relatively small size source (say a light emitting diode) to that from a relatively large size source (say a resistive filament). A relatively high powered sources tend to generate light more efficiently than from a low powered one however high intensity light can dazzle a viewer who perhaps inadvertently views the element directly.

One way to overcome the matter of dazzle is to configure the illumination system so that direct viewing of the illuminated filament cannot occur. However this requirement is not always readily met typically in situations where the envelope available for the illumination system is limited in size.

Another way is to overcome dazzle is to provide an optical filter but this necessarily attenuates the light output so rendering superfluous the use of a relatively high powered source.

However the matter of dazzle is not usually a critical matter in connection with an illumination system. More significant is the degree to which the system can effectively and efficiently illuminate the objects, surface or area involved.

According to the present invention there is provided An illumination device comprising:

- a body member;
- one or more sources of light aligned on a longitudinal axis of, and lying within, the body member;
- one or more transparent regions of the body member through which light from the or each source passes when the source or sources are energised; and

optical particles such as balls or chips of glass lying in the body member and extending between the or each source and that side of the or each transparent region which is directed towards the inside of the body member. Typically the sources of light are a plurality of light emitting solid state devices and the optical particles are glass balls.

According to a first preferred version of the present invention the body member is a tube of glass forming the sole transparent region of the body member.

According to a second preferred version of the present invention or of the first preferred version thereof the optical particles are of uniform size and shape.

According to a third preferred version of the present invention or of the first preferred version thereof the optical particles vary in size over a spectrum of sizes. Typically the optical particles are of similar shape.

According to a fourth preferred version of the present invention or of any preceding preferred version thereof there are provided a plurality of sources of light and at least one of the sources differs in output colour from at least one other of the sources.

According to a fifth preferred version of the present invention or of any preceding preferred version thereof the interior of the body member not occupied by the sources or the optical particles is filled with a gas or vapour, which latter term includes air, maintained at a controlled pressure relative to ambient atmospheric pressure.

According to a sixth preferred version of the present invention or of any preceding preferred version thereof the body member is a sealed enclosure with conductors for electricity powering the or each light source passing through a wall of the enclosure by way of a gas tight seal.

An exemplary embodiment of the invention will now be described with reference to the accompanying drawing of an illuminating device of which:

Figure 1 is a sectional elevation; and

Figure 2 is an end view of the device in direction of arrow II in Figure 1.

The figures variously show an illumination device 11 comprising a body member 12 of glass with end closures 13, 14. Four high intensity light emitting diodes ('LED's') 15, 16, 17, 18 are linked by a lead 19 and aligned by a mounting frame of plastic material on axis A. The lead 19 extends through end closure 14 and is connected to an external lead 20 to provide power to energise LED's 15 – 18.

The body member 12 has an inner surface 12A and an outer surface 12B. The body member is filled with a mass M of optical particles 22, in this case glass balls, which extend from the LED's 15 – 18 to inner surface 12A of the body member 12.

The mass M provides a diffusion path for light from the LED's 15 – 18 so that with the LED's energised by way of leads 19, 20 light from each of LED's 15 – 18 passes through the mass M to inner surface 12A whence out of the body member 12. As a result the generated light from the LED's is not significantly attenuated. However rather than the LED's 15 – 18 appearing from outside the device 11 as four bright sources of light the light output from outer surface 12B of the device 11 is uniformly and homogeneously bright in appearance. Without the mass M, and so the diffusion effect it provides, a direct viewing by an observer of average eyesight the individually apparent energised LED's would be likely to cause dazzling. With the mass M in place the resulting diffusing effect described results in the dazzling effect being substantially reduced if not eliminated. In addition apart from reducing the adverse effects of direct viewing the diffusion effect serves to improve illumination of an object by the device.

The body member 12 serves to house the LED's 15 – 18 and the mass M of optical particles 22. The overall size of the body member 12 is not large and is not limited as to shape. Consequently an illumination device according to the present invention can

be made up in a configurations appropriate for use in one or more of a wide range of possible applications. In many applications space and/or access can be limited. The components making up the present device are inherently stable and the device is not subject to significant thermal cycling as arises from the use of device utilising one or more light sources based on resistive elements.

The optical particles 22 in the exemplary embodiment are glass balls. A wide range of glasses are available from which the balls can be selected according to design criteria for a given application. Other optical particles can be including ones of naturally occurring or man made material. Mixtures of such material could be used for particular applications where a particular optical effect is needed. For a given mass M the particles can either be of the same size or vary in size over a spectrum of sizes. The optical particles in a given mass can be uniform in colour or vary in colour. In an experimental model the particles were optically pure spherical glass beads with a diameter lying in the range 1 – 2 mm. Tinted and/or non-optically pure beads could be used for particular applications.

In this case the body member 12 is an integral glass structure with inner surface 12A and external surface 12B. In an alternative version the body can be of relatively opaque material locating a transparent panel or transparent panels so that light from the LED's passes out through just the transparent panel or panels rather than from most if not all of the body member. The body member in this case is of glass. However plastics materials can be used. The body member is shown as being of cylindrical form. However the body member can be embodied in a wide range of sizes, shapes and structures including tubes, panels, multi-axis lights which can be straight and/or curved or combinations of shapes. If desired the body member can incorporate, or serve to retain, one or more lens elements so that light emitted from the body member by way of the, or each, lens element is changed in appearance from that emitted from the remainder of the body member.

Ranges of suitable LED's are available for use but ones of ultra high intensity have been found to be satisfactory for a number of experimental applications. Typically 'Plated Through Hole' ('PTH') and Surface Mount (SMT) LED's have been used. There are range of colours available including white, blue, yellow/orange, red and green. A typical LED output power is 1 candela running at a driving voltage of 3.0 – 4.0 volts DC

The number and spacing of the LED's within the body member can be selected without limitation since the body member can be designed to accommodate virtually any number, spacing or configuration.

The illumination device of the present invention is particularly intended as a device for illuminating objects in the vicinity of the device. Applications also exist in signalling or information display.

CLAIMS

- 1 An illumination device comprising:
 - a body member;
 - one or more sources of light aligned on a longitudinal axis of, and lying within, the body member;
 - one or more transparent regions of the body member through which light from the or each source passes when the source or sources are energised;
 - and
 - optical particles such a balls or chips of glass lying in the body member and extending between the or each source and that side of the or each transparent region which is directed towards the inside of the body member.
- 2 An illumination device as claimed in Claim 1 wherein the sources of light are a plurality of light emitting solid state devices and the optical particles are glass balls.
- 3 An illumination device as claimed in any preceding claim wherein the body member is a tube of glass forming the sole transparent region of the body member.
- 4 An illumination device as claimed in any preceding claim wherein the optical particles are of uniform size and shape.
- 5 An illumination device as claimed in Claims 1, 2 or 3 wherein the optical particles vary in size over a spectrum of sizes.
- 6 An illumination device as claimed in Claim 5 wherein the optical particles are of similar shape.

- 7 An illumination device as claimed in any preceding claim wherein there are a plurality of sources of light and at least one of the sources differs in output colour from at least one other of the sources.
- 8 An illumination device as claimed in any preceding claim wherein the interior of the body member not occupied by the sources or the optical particles is filled with a gas or vapour, which latter term includes air, maintained at a controlled pressure relative to ambient atmospheric pressure.
- 9 An illumination device as claimed in any preceding claim wherein the body member is a sealed enclosure with conductors for electricity powering the or each light source passing through a wall of the enclosure by way of a gas tight seal.
- 10 An illumination device as hereinbefore described with reference to the accompanying drawings.

ABSTRACT

ILLUMINATION DEVICE

An illumination device comprising: a body member; one or more sources of light aligned on a longitudinal axis of, and lying within, the body member; one or more transparent regions of the body member through which light from the or each source passes when the source or sources are energised; and optical particles such as balls or chips of glass lying in the body member and extending between the or each source and that side of the or each transparent region which is directed towards the inside of the body member.

